



Preparation Manual

Technology Education 6–12 (171)

Overview and Exam Framework
Sample Selected-Response Questions
Sample Selected-Response Answers and Rationales

Preparation Manual

Section 3: Overview and Exam Framework Technology Education 6–12 (171)

Exam Overview

Exam Name	Technology Education 6–12
Exam Code	171
Time	5 hours
Number of Questions	100 selected-response questions
Format	Computer-administered test (CAT)

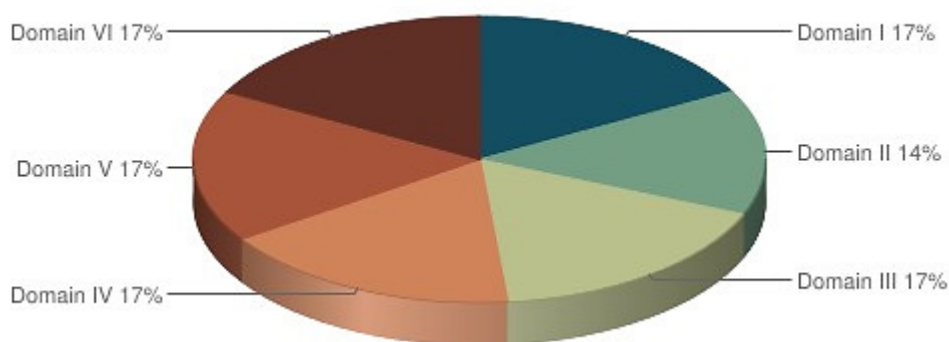
The TExES Technology Education 6–12 (171) exam is designed to assess whether an examinee has the requisite knowledge and skills that an entry-level educator in this field in Texas public schools must possess. The 100 selected-response questions are based on the Technology Education 6–12 exam framework. The exam may contain questions that do not count toward the score. Your final scaled score will be based only on scored questions.

The Standards

- Standard I** The technology education teacher understands the philosophy of technology education.
- Standard II** The technology education teacher understands the nature of technology.
- Standard III** The technology education teacher understands the interactions between technology and society.
- Standard IV** The technology education teacher understands technology and design processes.
- Standard V** The technology education teacher understands the use, maintenance, and impact of technology.
- Standard VI** The technology education teacher understands communication; manufacturing; construction; energy, power, and transportation; bio-related technology; and computer applications systems.
- Standard VII** The technology education teacher understands instructional development and facilities management.

Domains and Competencies

Domain	Domain Title	Approx. Percentage of Exam	Standards Assessed
I	Fundamentals of Technology Education	17%	Technology Education 6–12: I–VII
II	Communication	14%	Technology Education 6–12: VI
III	Manufacturing	17%	Technology Education 6–12: VI
IV	Construction	17%	Technology Education 6–12: VI
V	Energy, Power and Transportation	17%	Technology Education 6–12: VI
VI	Biotechnology and Computer Technology	17%	Technology Education 6–12: II, VI



The content covered by this exam is organized into broad areas of content called **domains**. Each domain covers one or more of the educator standards for this field. Within each domain, the content is further defined by a set of **competencies**. Each competency is composed of two major parts:

- The **competency statement**, which broadly defines what an entry-level educator in this field in Texas public schools should know and be able to do.
- The **descriptive statements**, which describe in greater detail the knowledge and skills eligible for testing.

Domain I—Fundamentals of Technology Education

Competency 001—The Technology Education teacher demonstrates knowledge of the nature and philosophy of technology and technology education and the interactions between technology and society.

The beginning teacher:

- A. Demonstrates knowledge of general characteristics of technology (e.g., technology involves innovation and creativity, technology products and systems alter the natural world and are designed to solve problems, there are limitations to technology’s ability to solve problems, new technologies are built on previous technologies) and of the history and evolution of technology.

- B. Understands how factors (e.g., scientific advances, access to capital, market demand) affect the rate of technological development and how technology makes it possible for scientists to extend research and explore new phenomena.
- C. Understands how technological systems and subsystems interact to achieve common goals and understands the role of control mechanisms and redundancy in technological systems.
- D. Identifies resources needed to develop and support a technological system, the properties of those resources, and how those resources are used in technological systems.
- E. Understands career opportunities, requirements, and expectations (e.g., teamwork, leadership, integrity, honesty) in technology and applies principles of career planning and skills for job seeking.
- F. Understands how ethical, economic, political, environmental and cultural considerations affect the development, selection and use of technologies.
- G. Understands how technology affects humans in various ways (e.g., effects on safety, comfort, choices, attitudes; positive and negative social, cultural, political and economic influences; connections between technology and various societal institutions) and understands the importance of having a technologically literate society.
- H. Understands the role of technology education in the world (e.g., how technology education helps students manage, use and understand technology; how technology education provides hands-on experience to students; the difference between technology education and career and workforce development education).

Competency 002—The Technology Education teacher understands the design process and its application in technology.

The beginning teacher:

- A. Understands the steps in the design process and recognizes the design process as a systematic, iterative method of solving problems.
- B. Understands factors (e.g., human and personal characteristics, principles of ergonomics, meeting specific needs such as those of people with special needs) that influence a design and factors (e.g., efficiency, reliability, functionality) that influence the quality of a product.
- C. Knows how to describe, develop and analyze technological products and systems that incorporate quality, reliability and safety using the universal systems model (i.e., input, process, output, feedback) and appropriate design processes and techniques.
- D. Knows how to evaluate a design in terms of given criteria (e.g., functionality, aesthetics, marketability) and recognizes trade-offs associated with technology and the need for compromises among competing factors in the design process.
- E. Knows how to use a variety of models (e.g., physical, mathematical, computer) and other methods to develop optimal designs for technological products.
- F. Understands methods for communicating designs to others.
- G. Identifies the chemical, mechanical and physical properties of materials.
- H. Applies mathematics, natural science and social science to analyze technology and applies processes and problem-solving methods (e.g., processes and methods from science, engineering, mathematics) to solve technological problems.

Competency 003—The Technology Education teacher demonstrates knowledge of the uses and impacts of technology and techniques for maintaining technology systems.

The beginning teacher:

- A. Understands how technology systems may be used to meet specific goals.
- B. Demonstrates knowledge of appropriate codes, laws, standards and regulations related to technology (e.g., Occupational Safety and Health Administration, American Society for Testing and Materials, Environmental Protection Agency, National Electrical Code).
- C. Identifies emerging technologies and their characteristics and recognizes their role in the evolution of technology.
- D. Knows how to collect, use and evaluate manuals, protocols and other resources to learn and understand how technologies function.
- E. Knows how to create maintenance plans and programs and recognizes the importance of proper maintenance and the consequences of improper maintenance.
- F. Applies strategies and procedures for maintaining safe and proper functioning of tools, equipment and machines.
- G. Applies procedures for handling and storing tools and materials and for operating technological systems so that they function in the way they were designed.
- H. Knows how to troubleshoot technological systems and determine causes of failure in materials, tools, equipment and machines.
- I. Applies procedures for repairing systems that are malfunctioning.

Competency 004—The Technology Education teacher knows how to plan, produce and manage a technology systems project.

The beginning teacher:

- A. Understands how to plan, produce, and manage a communication project using appropriate resources, technical processes and the basic communication model.
- B. Understands how to plan, produce and manage a manufacturing project using appropriate resources and technical processes.
- C. Understands how to plan, produce, and manage a construction project using appropriate resources and technical processes.
- D. Understands how to plan, produce and manage an energy, power and transportation project using appropriate resources and technical processes.
- E. Understands how to plan, produce, and manage a bio-related technology project using appropriate resources and technical processes.
- F. Understands how to plan, produce and manage a computer applications project using appropriate resources and technical processes.

Competency 005—The Technology Education teacher demonstrates knowledge of the philosophy of technology education; knows how to develop and implement a technology education program; and knows how to plan, manage and maintain technology education facilities.

The beginning teacher:

- A. Knows how to assess and prioritize the facility-related needs of a technology education program (e.g., solicit and evaluate input from stakeholders, ensure that the space and physical arrangement of instructional facilities are conducive to effective instruction).

- B. Identifies characteristics (including advantages and disadvantages) of a variety of layouts for instructional facilities.
- C. Applies procedures for ensuring that instructional facilities are accessible to individuals with special needs.
- D. Knows how to identify and use sources of information about regulations and guidelines (e.g., space requirements, environmental control, safety equipment) for the construction and use of instructional facilities in technology education.
- E. Knows how to maintain instructional facilities for the technology education program and how to develop schedules for inspecting tools and equipment and for performing routine maintenance.
- F. Knows how to access information pertaining to the installation, maintenance and repair of equipment used in technology education facilities.
- G. Knows how to identify, select and acquire tools, equipment and materials (e.g., computer hardware and software, multimedia equipment, power tools) used in the technology education program.
- H. Understands methods of effective financial planning and management (e.g., identifying funding sources; procedures related to accounting, auditing, reporting and keeping inventory records).
- I. Demonstrates knowledge of methods and procedures for maintaining a safe instructional facility (e.g., identifying sources of safety-related information, evaluating safety hazards, maintaining a safe and clean learning environment, providing safety instruction) and for responding to emergencies (e.g., recognizing appropriate responses to given emergencies, identifying procedures for using safety equipment).

Domain II—Communication

Competency 006—The Technology Education teacher demonstrates knowledge of drafting.

The beginning teacher:

- A. Knows how to select and use tools and materials for sketching and for technical drawing.
- B. Applies technical drawing conventions to produce and interpret drawings (e.g., multiview drawings, sectional views, pictorial representations, detail and assembly drawings).
- C. Knows how to create working drawings, presentation drawings and models for residential, community, and business needs.
- D. Understands the use of scales and dimensioning skills in producing and interpreting technical drawings.
- E. Knows how to use software related to technical drawing.

Competency 007—The Technology Education teacher demonstrates knowledge of equipment and techniques used in graphic design, photography and image transfer and reproduction.

The beginning teacher:

- A. Understands principles (e.g., perspective, shading, balance, proportion, harmony), elements (e.g., line, form, color), and applications (e.g., architectural, engineering) of graphic design.
- B. Demonstrates knowledge of equipment (e.g., input devices, output devices) and software (e.g., common characteristics of desktop publishing software, issues related to compatibility between software packages) used in desktop publishing.
- C. Demonstrates knowledge of skills (e.g., word processing, illustrating, layout) used in desktop publishing.

- D. Understands principles of photographic composition (e.g., lighting, perspective, focus) and how to select and use photographic equipment and materials.
- E. Applies techniques and processes related to photography (e.g., computer manipulation of images, product finishing processes).
- F. Knows how to select and use materials related to image transfer and reproduction.
- G. Understands techniques and processes related to image carrier preparation, transfer and reproduction.

Competency 008—The Technology Education teacher demonstrates knowledge of video and audio systems (e.g., radio, television), production techniques (e.g., recording, editing) and equipment (e.g., amplifiers, video cameras).

The beginning teacher:

- A. Demonstrates knowledge of equipment used in video and audio production (e.g., cameras, microphones, mixers, amplifiers, lighting equipment) and of how this equipment is interconnected in recording systems.
- B. Understands skills and techniques used in video and audio recording.
- C. Understands skills used to manipulate video and audio files (e.g., video and audio editing techniques; file compression schemes; procedures for integrating video, audio, animation and special effects) and techniques for maintaining image and sound integrity during postproduction).

Competency 009—The Technology Education teacher demonstrates knowledge of electronic communication.

The beginning teacher:

- A. Understands scientific and technological concepts related to electronic communication.
- B. Demonstrates knowledge of materials and components used in electronic communication systems (e.g., satellite dishes, transmitters, receivers, uplinks, downlinks).
- C. Understands processes involved in electronic communication (e.g., how electromagnetic, satellite, and laser communication technologies send, transmit and receive messages).

Domain III—Manufacturing

Competency 010—The Technology Education teacher demonstrates knowledge of types of manufacturing systems and of the organization, structure and management of manufacturing enterprises.

The beginning teacher:

- A. Demonstrates knowledge of types of manufacturing systems (e.g., custom, repetitive).
- B. Identifies types of organizational structures used in manufacturing enterprises and their characteristics.
- C. Understands how workforce organization and management structure can influence technological development.

Competency 011—The Technology Education teacher demonstrates knowledge of the principles of product development and of the application of economic and marketing principles to manufacturing.

The beginning teacher:

- A. Understands marketing processes and techniques and their use in preparing a marketing plan for an idea, product, or service.

- B. Demonstrates knowledge of financial factors associated with starting and operating manufacturing enterprises.
- C. Understands how competition, economic investment, risk and the potential for economic reward influence the process of technological innovation and production.
- D. Applies economic and marketing principles (e.g., cost-price relationships, supply and demand) to manufacturing.
- E. Demonstrates knowledge of principles of product development (e.g., design, prototype construction, testing).

Competency 012—The Technology Education teacher understands how to use tools and equipment in manufacturing.

The beginning teacher:

- A. Identifies types and characteristics of tools and equipment (e.g., micrometers, milling machines, lathes, jigs and fixtures, saws, drills, welding machines, computer numerical control machines) used in manufacturing.
- B. Knows how to use tools and equipment used in manufacturing.
- C. Knows how to maintain and adjust tools and equipment used in manufacturing.
- D. Understands safety issues related to the maintenance and use of tools and equipment used in manufacturing.

Competency 013—The Technology Education teacher demonstrates knowledge of materials used in manufacturing.

The beginning teacher:

- A. Identifies types and properties (e.g., elasticity, ductility, corrosion resistance) of raw materials used in manufacturing.
- B. Compares and contrasts the structure and properties of natural, synthetic and composite materials.
- C. Knows how to select appropriate materials for a given manufacturing application.

Competency 014—The Technology Education teacher demonstrates knowledge of manufacturing processes and quality control procedures.

The beginning teacher:

- A. Demonstrates knowledge of processes used in manufacturing (e.g., casting, molding, forming, separating, conditioning, assembling, finishing).
- B. Demonstrates knowledge of the uses of automated systems (e.g., robotics, artificial intelligence, computer integrated manufacturing) in technology.
- C. Knows how to apply quality control procedures in manufacturing.

Domain IV—Construction

Competency 015—The Technology Education teacher demonstrates knowledge of types of construction projects, procedures for planning, surveying and preparing sites for construction projects and postconstruction activities.

The beginning teacher:

- A. Identifies types (e.g., residential, civil, commercial) and characteristics of construction projects.
- B. Understands how to plan, produce and manage a construction systems project.
- C. Understands how to prepare a site for a construction project.
- D. Demonstrates knowledge of surveying tools and equipment and their uses.
- E. Reads and interprets documents (e.g., survey reports, construction plans, zoning restrictions, building codes, environmental regulations) related to construction projects.
- F. Understands procedures related to postconstruction activities (e.g., site cleanup, waste disposal, landscaping) at a construction site.

Competency 016—The Technology Education teacher knows how to apply engineering principles to construction projects.

The beginning teacher:

- A. Identifies terms and concepts used in engineering.
- B. Applies engineering principles (e.g., tension, shear) to solve problems related to construction projects.
- C. Analyzes the structural properties of construction designs (e.g., truss, cantilever, arch, suspension).

Competency 017—The Technology Education teacher understands how to use hand and power tools in construction.

The beginning teacher:

- A. Identifies types and characteristics of measuring devices, hand tools and power tools and equipment (e.g., rules, saws, drills, levels, cranes, backhoes) used in construction.
- B. Knows how to use measuring devices, tools and equipment used in construction.
- C. Knows how to maintain and adjust tools and equipment used in construction.
- D. Understands safety issues related to the maintenance and use of tools and equipment used in construction.
- E. Understands the safe and proper use of tools and equipment used in construction.

Competency 018—The Technology Education teacher demonstrates knowledge of construction materials and their properties.

The beginning teacher:

- A. Identifies types and properties (e.g., moisture content, strength, hardness, oxidation) of raw materials (e.g., wood, steel, concrete, masonry, glass) used in construction.
- B. Compares and contrasts the properties of materials used in construction.
- C. Knows how to select appropriate materials for a given construction application.

Competency 019—The Technology Education teacher demonstrates knowledge of skills and techniques used for building, maintaining and repairing structures.

The beginning teacher:

- A. Demonstrates knowledge of skills and techniques used for building structures.
- B. Demonstrates knowledge of skills and techniques used for maintaining and repairing structures.
- C. Demonstrates knowledge of skills and techniques related to framing (e.g., platform framing, post and beam) and roofing.
- D. Demonstrates knowledge of subsystems (e.g., HVAC, plumbing, electrical) in construction projects.

Domain V—Energy, Power and Transportation

Competency 020—The Technology Education teacher demonstrates knowledge of scientific concepts related to energy and power.

The beginning teacher:

- A. Identifies scientific concepts and principles (e.g., conservation of energy, mechanical advantage, Pascal's principle, Bernoulli's principle) related to energy and power.
- B. Identifies types of energy (e.g., chemical, electrical) and methods of converting one form of energy to another (e.g., gas turbine, internal combustion engine, photovoltaic cell).
- C. Applies concepts and units of force, work, energy and power to solve problems in technology.
- D. Applies scientific concepts and principles to solve problems related to energy, power and transportation systems.

Competency 021—The Technology Education teacher understands issues related to energy consumption and conservation.

The beginning teacher:

- A. Identifies sources, availability and uses of renewable (e.g., solar, wind) and nonrenewable (e.g., coal, oil) energy.
- B. Understands issues (e.g., consumer choices, costs, impact on the environment) related to conserving natural resources and promoting sustainable development through techniques such as reusing, reducing and recycling.
- C. Demonstrates knowledge of processes used in extraction, production, transportation and storage of energy resources.

Competency 022—The Technology Education teacher understands characteristics of thermal, electrical, fluid and mechanical power systems and methods of control, transmission and storage of energy and power.

The beginning teacher:

- A. Identifies characteristics of thermal, electrical, fluid and mechanical power systems.
- B. Demonstrates knowledge of methods of control, transmission and storage of energy and power (e.g., pneumatic and hydraulic systems, flywheels, batteries, dams).
- C. Analyzes the design of thermal, electrical, fluid and mechanical power systems and recognizes advantages and disadvantages of systems designed for given functions.

- D. Understands the role of mechanical parts such as levers, cams, gear trains, belts and pulleys in controlling and transmitting power.

Competency 023—The Technology Education teacher demonstrates knowledge of principles and applications of electronics.

The beginning teacher:

- A. Identifies types and characteristics of basic electronic components (e.g., resistors, inductors, transistors).
- B. Interprets schematic diagrams (e.g., determines function of a given circuit, determines the role of components in circuits) of AC and DC circuits and of analog and digital circuits.
- C. Analyzes voltage, resistance, current and power in series and parallel AC and DC circuits.
- D. Relates the operating principles of motors, meters, transformers and generators to basic principles of electricity and magnetism.

Competency 024—The Technology Education teacher demonstrates knowledge of the design and use of vehicles and vehicular subsystems and the characteristics of land, air, water and space transportation systems.

The beginning teacher:

- A. Identifies the characteristics of land, air, water and space transportation systems and their economic, safety and environmental impacts.
- B. Demonstrates knowledge of issues related to the design and use of vehicles (e.g., airplanes, trains, automobiles) and vehicular subsystems (e.g., powertrains, suspensions).
- C. Understands aerodynamic principles related to the design of transportation vehicles.

Domain VI—Biotechnology and Computer Technology

Competency 025—The Technology Education teacher understands the role of biotechnology in business, industry and society.

The beginning teacher:

- A. Demonstrates knowledge of applications of bio-related technologies in business and industry.
- B. Demonstrates knowledge of ethical and legal considerations associated with the selection, development and use of bio-related technologies, including emerging and innovative technologies.
- C. Identifies the intended and unintended effects of bio-related technology (e.g., effect of hazardous waste on the environment, social and economic effects of bio-related technologies) and strategies for assessing risks and benefits of bio-related technologies.

Competency 026—The Technology Education teacher demonstrates knowledge of principles of bio-related technologies.

The beginning teacher:

- A. Understands the scientific principles of bio-related technologies.
- B. Demonstrates knowledge of principles and methods used in environmental engineering.
- C. Understands issues related to renewable and nonrenewable resources.
- D. Demonstrates knowledge of tools, equipment and materials used in bio-related technologies.

Competency 027—The Technology Education teacher demonstrates knowledge of basic principles related to computer technology.

The beginning teacher:

- A. Identifies types, characteristics and functions of computer hardware (e.g., server, router, video card, hub, modem), software applications (e.g., spreadsheets, firewall software, database management software, FTP client) and operating systems.
- B. Understands basic concepts of computer network architecture (e.g., LAN, WAN, Internet) and principles of data transfer within and between computer networks (e.g., role of network protocols such as TCP/IP).
- C. Knows how to perform routine installation, maintenance and troubleshooting procedures for stand-alone computers and computer networks.
- D. Understands the role of computer programs and computer languages in computer technology.

Competency 028—The Technology Education teacher understands appropriate and effective uses of computer technology.

The beginning teacher:

- A. Understands computer system requirements for given applications.
- B. Identifies characteristics and uses of a variety of computer software applications (e.g., productivity, graphic design, modeling, multimedia, authoring).
- C. Demonstrates knowledge of issues (e.g., ethical, legal, commercial, privacy) related to security (e.g., use of firewalls and virus-protection software, passwords and log on procedures and protocols) and the use of computer technology to transfer and access information.

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Section 4: Sample Selected-Response Questions Technology Education 6–12 (171)

This section presents some sample exam questions for you to review as part of your preparation for the exam. To demonstrate how each competency may be assessed, sample questions are accompanied by the competency that they measure. While studying, you may wish to read the competency before and after you consider each sample question. Please note that the competency statements do not appear on the actual exam.

For each sample exam question, there is a correct answer and a rationale for each answer option. The sample questions are included to illustrate the formats and types of questions you will see on the exam; however, your performance on the sample questions should not be viewed as a predictor of your performance on the actual exam.

Domain I—Fundamentals of Technology Education

Competency 001—The Technology Education teacher demonstrates knowledge of the nature and philosophy of technology and technology education and the interactions between technology and society.

1. Which of the following companies developed the first single-chip microprocessor?
 - A. Intel
 - B. Motorola
 - C. Texas Instruments
 - D. Advanced Micro Devices

Answer _____

Competency 002—The Technology Education teacher understands the design process and its application in technology.

2. If a car has cruise control, which of the following aspects is removed from the feedback loop?
 - A. Speed
 - B. Engine
 - C. Speedometer
 - D. Driver

Answer _____

Competency 003—The Technology Education teacher demonstrates knowledge of the uses and impacts of technology and techniques for maintaining technology systems.

3. Which of the following statements about the National Electric Code (NEC) is true?
 - A. Jurisdictions that adopt the NEC must adopt installation codes at the same time.
 - B. The NEC ensures that the same electric codes are enforced across the United States.

- C. The NEC is more effective when jurisdictions adopt it as law.
- D. Amendments to the NEC are primarily made at local, not state, levels.

Answer _____

Competency 004—The Technology Education teacher knows how to plan, produce and manage a technology systems project.

4. A technology education class is planning the design and production of an all-in-one remote control for the home. The teacher wants the class to understand the importance of considering human factors in the project. Which of the following is the best first activity to assign the students?

- A. Explaining the importance of ergonomics as it relates to the target design
- B. Sketching prototypes of the remote control that will work with various sizes of human hands
- C. Determining the dimensions and sizes of input mechanisms, such as keyboards
- D. Defining which areas of the home will be controlled by the remote

Answer _____

5. Designing a logo to accurately communicate a company's message is an example of which of the following steps of the communication model?

- A. Encoding
- B. Transmitting
- C. Decoding
- D. Evaluating

Answer _____

Competency 005—The Technology Education teacher demonstrates knowledge of the philosophy of technology education; knows how to develop and implement a technology education program; and knows how to plan, manage and maintain technology education facilities.

6. Which of the following is a primary advantage of using a horseshoe layout in a computer classroom?

- A. It saves space.
- B. It encourages discussion.
- C. It allows students to work in groups.
- D. It allows easy access to individual students.

Answer _____

Domain II—Communication

Competency 006—The Technology Education teacher demonstrates knowledge of drafting.

7. Which THREE of the following tabs are used exclusively in the 3-D work space of AutoCAD?

- A. Solid
- B. Layout
- C. Surface
- D. Mesh
- E. Parametric

Answer _____

Competency 007—The Technology Education teacher demonstrates knowledge of equipment and techniques used in graphic design, photography and image transfer and reproduction.

8. Which of the following actions will best enable viewers of a Web site to process written information?

- A. Using multiple fonts
- B. Leaving white space
- C. Using multiple colors
- D. Maintaining consistent styles

Answer _____

Competency 008—The Technology Education teacher demonstrates knowledge of video and audio systems (e.g., radio, television), production techniques (e.g., recording, editing) and equipment (e.g., amplifiers, video cameras).

9. A student who is filming a scene moves the camera from the first floor to the second floor of the school along a constant vertical axis. The student is primarily using which of the following camera moves?

- A. Tilt
- B. Pan
- C. Pedestal
- D. Zoom

Answer _____

Competency 009—The Technology Education teacher demonstrates knowledge of electronic communication.

10. Which of the following statements about electronic communication is true?

- A. One-way transmissions are also known as full or half duplex.
- B. Digital signals are often broad, continuous codes.
- C. Messages are converted to analog signals before being sent over cable.
- D. Electronic signals repeatedly switch from digital to analog.

Answer _____

Domain III—Manufacturing

Competency 011—The Technology Education teacher demonstrates knowledge of types of manufacturing systems and of the organization, structure and management of manufacturing enterprises.

11. During which of the following processes does a product go through a promotional stage before being moved into full production?

- A. Commercialization
- B. Test marketing
- C. Product development
- D. Product screening

Answer _____

12. Which of the following strategies is the best approach in developing a successful marketing plan?

- A. Focusing efforts on new customers instead of returning customers
- B. Having a general idea of what customers want
- C. Developing a unique selling proposition that sets the company apart
- D. Creating an advertising plan using minimal research

Answer _____

13. A technology education teacher is planning an activity that asks students to create a marketing plan. Which of the following is the best first step for the students to take?

- A. Determine the product being marketed.
- B. Identify the ideal customer.
- C. Create materials to educate the market.
- D. Develop an overarching plan.

Answer _____

Competency 013—The Technology Education teacher demonstrates knowledge of materials used in manufacturing.

14. Which of the following is a key weakness of composite decking?

- A. It requires sanding or using chemical strippers for surface preparation.
- B. It is susceptible to load failure if there are incorrectly formed joints.
- C. It easily degrades in the absence of proper drainage and airflow.
- D. It is vulnerable to sagging when temperatures soar.

Answer _____

Competency 014—The Technology Education teacher demonstrates knowledge of manufacturing processes and quality control procedures.

15. Which of the following power tools is best used to finish edges of metal after cutting or welding?

- A. Lathe
- B. Deburring and polishing machine
- C. Drill press
- D. Sheet metal shear machine

Answer _____

Domain IV—Construction

Competency 015—The Technology Education teacher demonstrates knowledge of types of construction projects, procedures for planning, surveying and preparing sites for construction projects and postconstruction activities.

16. Which of the following tools is best for a surveyor to use to measure both horizontal and vertical angles?

- A. Compass
- B. Level
- C. Chain
- D. Transit

Answer _____

Competency 016—The Technology Education teacher knows how to apply engineering principles to construction projects.

17. Which of the following methods best improves surface density when pouring concrete?

- A. Covering the concrete with protective plastic
- B. Vibrating the concrete once poured
- C. Adding extra water to the concrete
- D. Adding cement powder to the concrete

Answer _____

Competency 017—The Technology Education teacher understands how to use hand and power tools in construction.

18. Which of the following types of tools is powered by compressed air?

- A. Powder-actuated
- B. Pneumatic
- C. Hydraulic power
- D. Electric

Answer _____

19. Which TWO of the following saws are best suited for cutting an eight-foot two-by-four board in half?

- A. Band saw
- B. Table saw
- C. Circular saw
- D. Jigsaw
- E. Handsaw

Answer _____

Competency 018—The Technology Education teacher demonstrates knowledge of construction materials and their properties.

20. Which of the following is the strongest alloy?

- A. Steel
- B. Tungsten
- C. Chromium
- D. Titanium

Answer _____

Competency 019—The Technology Education teacher demonstrates knowledge of skills and techniques used for building, maintaining and repairing structures.

21. Which of the following is the main advantage of using roof trusses when building houses?

- A. Trusses expedite the building process.
- B. Trusses prevent rainwater from damaging the roof decking.
- C. Trusses provide a strong and secure cover for the house.
- D. Trusses create a moisture barrier to protect the wooden framing.

Answer _____

Domain V—Energy, Power and Transportation

Competency 020—The Technology Education teacher demonstrates knowledge of scientific concepts related to energy and power.

22. Which of the following types of energy is primarily created by electromagnetic waves?

- A. Chemical energy
- B. Sound energy
- C. Nuclear energy
- D. Radiant energy

Answer _____

Competency 021—The Technology Education teacher understands issues related to energy consumption and conservation.

23. Which of the following is the most common type of active solar collector?

- A. Flat-plate
- B. Direct gain
- C. Parabolic dish
- D. Linear-concentrating parabolic

Answer _____

Competency 022—The Technology Education teacher understands characteristics of thermal, electrical, fluid and mechanical power systems and methods of control, transmission and storage of energy and power.

24. A wheelbarrow is an everyday example of which of the following types of levers?

- A. Class-1
- B. Class-2
- C. Class-3
- D. Class-4

Answer _____

Competency 023—The Technology Education teacher demonstrates knowledge of principles and applications of electronics.

25. Rising temperature in a copper wire has which of the following effects on the flow of electricity?

- A. Electrical flow increases.
- B. Electrical flow decreases.
- C. Electrical flow does not change.
- D. Electrical flow is not carried.

Answer _____

Competency 024—The Technology Education teacher demonstrates knowledge of the design and use of vehicles and vehicular subsystems and the characteristics of land, air, water and space transportation systems.

26. A teacher asks an eighth-grade class to design a paper airplane that can fly high on a windy day. The assigned activity best teaches students the principle of

- A. thrust.
- B. force.
- C. lift.
- D. gravity.

Answer _____

Domain VI—Biotechnology and Computer Technology

Competency 025—The Technology Education teacher understands the role of biotechnology in business, industry and society.

27. Which of the following topics best addresses a primary ethical concern of biofuel production?

- A. Biofuel production often uses bioremediation to stimulate bacteria that turns waste into harmless by-products.
- B. Biofuel production often causes food and energy to compete for limited agricultural resources.
- C. Biofuel production can lead to unintentional cross-pollination of weeds and wild relatives of the crop species.
- D. Biofuel production can create a carbon-monoxide-infused slurry that requires special care and disposal.

Answer _____

28. The United States government currently regulates food produced from genetically modified crops by

- A. treating it like any other food, irrespective of production method.
- B. requiring some foods in this category to carry a 'bioengineered' label.
- C. delaying approval while testing for long-term side effects.
- D. banning it for human consumption through legislation.

Answer _____

Competency 026—The Technology Education teacher demonstrates knowledge of principles of bio-related technologies.

29. Which of the following pieces of equipment is used to view internal structures without the use of radiation?

- A. CT scan
- B. Mammography
- C. Ultrasound
- D. X-ray

Answer _____

Competency 027—The Technology Education teacher demonstrates knowledge of basic principles related to computer technology.

30. Which of the following is the fastest type of cache memory in a computer?

- A. L1
- B. L2
- C. RAM
- D. ROM

Answer _____

31. Which of the following is a unique numerical identifier assigned to computers that are networked on an intranet or through the Internet?

- A. MAC address
- B. ISSN
- C. IP address
- D. SSID

Answer _____

Competency 028—The Technology Education teacher understands appropriate and effective uses of computer technology.

32. Which of the following types of software is best for gathering data and presenting an analysis?

- A. System
- B. Educational
- C. Multimedia
- D. Productivity

Answer _____

Preparation Manual

Section 4: Sample Selected-Response Answers and Rationales Technology Education 6–12 (171)

This section presents some sample exam questions for you to review as part of your preparation for the exam. To demonstrate how each competency may be assessed, sample questions are accompanied by the competency that they measure. While studying, you may wish to read the competency before and after you consider each sample question. Please note that the competency statements do not appear on the actual exam.

For each sample exam question, there is a correct answer and a rationale for each answer option. The sample questions are included to illustrate the formats and types of questions you will see on the exam; however, your performance on the sample questions should not be viewed as a predictor of your performance on the actual exam.

Domain I—Fundamentals of Technology Education

Competency 001—The Technology Education teacher demonstrates knowledge of the nature and philosophy of technology and technology education and the interactions between technology and society.

1. Which of the following companies developed the first single-chip microprocessor?

- A. Intel
- B. Motorola
- C. Texas Instruments
- D. Advanced Micro Devices

Answer

Option A is correct because Intel produced the 4004 chip, the first single-chip microprocessor. **Options B, C and D are incorrect** because these companies created their processors after Intel.

Competency 002—The Technology Education teacher understands the design process and its application in technology.

2. If a car has cruise control, which of the following aspects is removed from the feedback loop?

- A. Speed
- B. Engine
- C. Speedometer
- D. Driver

Answer

Option D is correct because the driver is removed from the feedback loop when the speed is automatically monitored. **Option A is incorrect** because speed is one of the elements of the feedback system. **Option B is incorrect** because the engine is the part of the system that propels the car. **Option C is incorrect** because the speedometer monitors the speed to make sure the car is at the desired speed.

Competency 003—The Technology Education teacher demonstrates knowledge of the uses and impacts of technology and techniques for maintaining technology systems.

3. Which of the following statements about the National Electric Code (NEC) is true?
- A. Jurisdictions that adopt the NEC must adopt installation codes at the same time.
 - B. The NEC ensures that the same electric codes are enforced across the United States.
 - C. The NEC is more effective when jurisdictions adopt it as law.
 - D. Amendments to the NEC are primarily made at local, not state, levels.

Answer

Option C is correct because when adopted into law by states and local jurisdictions, the NEC has a more real significance. **Option A is incorrect** because installation-code timing is different among locals. **Option B is incorrect** because different electrical codes are enforced across the United States. **Option D is incorrect** because the NEC can be adopted with both state and local amendments.

Competency 004—The Technology Education teacher knows how to plan, produce and manage a technology systems project.

4. A technology education class is planning the design and production of an all-in-one remote control for the home. The teacher wants the class to understand the importance of considering human factors in the project. Which of the following is the best first activity to assign the students?
- A. Explaining the importance of ergonomics as it relates to the target design
 - B. Sketching prototypes of the remote control that will work with various sizes of human hands
 - C. Determining the dimensions and sizes of input mechanisms, such as keyboards
 - D. Defining which areas of the home will be controlled by the remote

Answer

Option A is correct because in order for students to begin considering design implications and use, they must first understand the principles of ergonomics, which studies how the interactions between humans and the elements of a system can optimize humans' well-being. **Options B, C and D are incorrect** because they should be introduced only after some foundational knowledge has been introduced and understood.

5. Designing a logo to accurately communicate a company's message is an example of which of the following steps of the communication model?
- A. Encoding
 - B. Transmitting
 - C. Decoding
 - D. Evaluating

Answer

Option A is correct because encoding is the process of translating an idea into symbols that receivers can understand. In this case, the logo is the visual symbol used to encode the company's image. **Option B is incorrect** because transmission is the process of sending the message through various channels. In this case, transmission may occur when the logo is printed and distributed on a business card. **Option C is incorrect**

because decoding is the processing stage in which the receiver interprets the message. In this case, decoding takes place when a customer sees the logo and forms an opinion about the company based on the logo. **Option D is incorrect** because evaluating is what happens at the end of the process to determine if receivers (customers) got the intended message.

Competency 005—The Technology Education teacher demonstrates knowledge of the philosophy of technology education; knows how to develop and implement a technology education program; and knows how to plan, manage and maintain technology education facilities.

6. Which of the following is a primary advantage of using a horseshoe layout in a computer classroom?
- A. It saves space.
 - B. It encourages discussion.
 - C. It allows students to work in groups.
 - D. It allows easy access to individual students.

Answer

Option D is correct because horseshoe positioning has an opening that allows the instructor to have easy access to students. **Option A is incorrect** because the horseshoe requires a large room; therefore, saving space is not a benefit. **Option B is incorrect** because the horseshoe only allows interaction between students on either side of the table. **Option C is incorrect** because the horseshoe does not allow students to communicate easily in groups.

Domain II—Communication

Competency 006—The Technology Education teacher demonstrates knowledge of drafting.

7. Which THREE of the following tabs are used exclusively in the 3-D work space of AutoCAD?
- A. Solid
 - B. Layout
 - C. Surface
 - D. Mesh
 - E. Parametric

Answer

Option A is correct because the solid tab only appears in the 3-D work space. **Option C is correct** because the surface tab only appears in the 3-D work space. **Option D is correct** because the mesh tab only appears in the 3-D work space. **Option B is incorrect** because the layout tab only appears in the 2-D work space. **Option E is incorrect** because the parametric tab appears in both the 2-D and 3-D work spaces.

Competency 007—The Technology Education teacher demonstrates knowledge of equipment and techniques used in graphic design, photography and image transfer and reproduction.

8. Which of the following actions will best enable viewers of a Web site to process written information?
- A. Using multiple fonts
 - B. Leaving white space

- C. Using multiple colors
- D. Maintaining consistent styles

Answer

Option B is correct because leaving white space focuses the viewer's attention and gives the opportunity to take a break from all the information provided. **Option A is incorrect** because when fonts vary too much, it can be distracting and can disrupt the viewer's understanding. **Option C is incorrect** because colors provide emphasis but don't necessarily help the viewer understand the intended message. **Option D is incorrect** because consistency of style must be used when creating a project, but it does not play as big a part in helping the viewer process information as white space does.

Competency 008—The Technology Education teacher demonstrates knowledge of video and audio systems (e.g., radio, television), production techniques (e.g., recording, editing) and equipment (e.g., amplifiers, video cameras).

9. A student who is filming a scene moves the camera from the first floor to the second floor of the school along a constant vertical axis. The student is primarily using which of the following camera moves?

- A. Tilt
- B. Pan
- C. Pedestal
- D. Zoom

Answer

Option C is correct because physically moving the camera up or down along a constant vertical axis is called a pedestal shot. **Option A is incorrect** because in a tilt shot, only the camera lens moves; the camera itself remains in the same spot. **Option B is incorrect** because to pan means to move the camera lens from side to side. The camera itself remains in the same spot. **Option D is incorrect** because to zoom means to use the lens to make the subject appear farther away or closer to the camera.

Competency 009—The Technology Education teacher demonstrates knowledge of electronic communication.

10. Which of the following statements about electronic communication is true?

- A. One-way transmissions are also known as full or half duplex.
- B. Digital signals are often broad, continuous codes.
- C. Messages are converted to analog signals before being sent over cable.
- D. Electronic signals repeatedly switch from digital to analog.

Answer

Option D is correct because electronic signals change from analog to digital and vice versa. **Option A is incorrect** because one-way transmissions are known as simplex. **Option B is incorrect** because digital signals are discrete on/off codes. **Option C is incorrect** because messages are converted to electrical signals instead of analog signals.

Domain III—Manufacturing

Competency 011—The Technology Education teacher demonstrates knowledge of types of manufacturing systems and of the organization, structure and management of manufacturing enterprises.

11. During which of the following processes does a product go through a promotional stage before being moved into full production?

- A. Commercialization
- B. Test marketing
- C. Product development
- D. Product screening

Answer

Option B is correct because test marketing enables the company to test the product out before fully manufacturing it on a large scale. **Option A is incorrect** because commercialization is the process of introducing a new product or production method into commerce—making it available on the market. **Option C is incorrect** because product development describes the process of developing the product. **Option D is incorrect** because product screening is the process by which a company makes a selection from a set of potential products.

12. Which of the following strategies is the best approach in developing a successful marketing plan?

- A. Focusing efforts on new customers instead of returning customers
- B. Having a general idea of what customers want
- C. Developing a unique selling proposition that sets the company apart
- D. Creating an advertising plan using minimal research

Answer

Option C is correct because a unique selling proposition sets businesses apart from the competition. **Option A is incorrect** because most business is generated from repeat customers, not new customers. **Option B is incorrect** because having only a general idea is not enough; businesses should determine specifically what their customers want. **Option D is incorrect** because developing an effective advertising plan requires extensive research.

13. A technology education teacher is planning an activity that asks students to create a marketing plan. Which of the following is the best first step for the students to take?

- A. Determine the product being marketed.
- B. Identify the ideal customer.
- C. Create materials to educate the market.
- D. Develop an overarching plan.

Answer

Option B is correct because most experts recommend identifying the customer for the product as the first step. **Option A is incorrect** because the product is being provided to the students, so it has already been identified. **Option C is incorrect** because educational materials must be geared toward the ideal customer. **Option D is incorrect** because an overarching plan can only be developed after identifying the market, or ideal customer.

Competency 013—The Technology Education teacher demonstrates knowledge of materials used in manufacturing.

14. Which of the following is a key weakness of composite decking?

- A. It requires sanding or using chemical strippers for surface preparation.
- B. It is susceptible to load failure if there are incorrectly formed joints.
- C. It easily degrades in the absence of proper drainage and airflow.
- D. It is vulnerable to sagging when temperatures soar.

Answer

Option C is correct because composite decking, which contains about 50 percent wood dust, can easily degrade without proper drainage and airflow. **Option A is incorrect** because applying chemical strippers and sanding is done before staining a wooden deck. **Option B is incorrect** because susceptibility to load failure from incorrectly formed joints is a drawback of an aluminum deck. **Option D is incorrect** because vulnerability to sagging in high temperatures is a drawback of a plastic deck.

Competency 014—The Technology Education teacher demonstrates knowledge of manufacturing processes and quality control procedures.

15. Which of the following power tools is best used to finish edges of metal after cutting or welding?

- A. Lathe
- B. Deburring and polishing machine
- C. Drill press
- D. Sheet metal shear machine

Answer

Option B is correct because a deburring and polishing machine uses abrasive material like sandpaper to smooth and polish the ragged edges that result from cutting or welding. **Option A is incorrect** because a lathe rotates a part against a tool whose position it controls. It is useful for fabricating parts or features that have a circular cross section. **Option C is incorrect** because a drill press is a rotating power tool that uses drill-bit tools of various sizes for boring cylindrical holes in wood, metal, plastic, etc. **Option D is incorrect** because a sheet metal shear machine can be a manual or power metal-cutting tool.

Domain IV—Construction

Competency 015—The Technology Education teacher demonstrates knowledge of types of construction projects, procedures for planning, surveying and preparing sites for construction projects and postconstruction activities.

16. Which of the following tools is best for a surveyor to use to measure both horizontal and vertical angles?

- A. Compass
- B. Level
- C. Chain
- D. Transit

Answer

Option D is correct because the transit is a surveyor's tool that measures both horizontal and vertical angles. **Option A is incorrect** because a compass determines the direction of a line. **Option B is incorrect** because a level determines elevation. **Option C is incorrect** because a chain measures distance.

Competency 016—The Technology Education teacher knows how to apply engineering principles to construction projects.

17. Which of the following methods best improves surface density when pouring concrete?

- A. Covering the concrete with protective plastic
- B. Vibrating the concrete once poured
- C. Adding extra water to the concrete
- D. Adding cement powder to the concrete

Answer

Option B is correct because vibrating the concrete once poured eliminates small bubbles and holes that can appear on the surface of the concrete when dry. **Option A is incorrect** because covering concrete with plastic will keep excess water off, not improve surface density. **Option C is incorrect** because adding extra water will make the concrete soft and weak. **Option D is incorrect** because while adding cement powder will increase the overall strength of the concrete, the surface density will not be affected.

Competency 017—The Technology Education teacher understands how to use hand and power tools in construction.

18. Which of the following types of tools is powered by compressed air?

- A. Powder-actuated
- B. Pneumatic
- C. Hydraulic power
- D. Electric

Answer

Option B is correct because pneumatic tools are powered by compressed air. **Option A is incorrect** because powder-actuated tools are powered by gunpowder. **Option C is incorrect** because hydraulic power tools are powered by fluids. **Option D is incorrect** because electric tools are powered by electricity.

19. Which TWO of the following saws are best suited for cutting an eight-foot two-by-four board in half?

- A. Band saw
- B. Table saw
- C. Circular saw
- D. Jigsaw
- E. Handsaw

Answer

Option C is correct because a circular saw is designed for rough, fast cutting of wood. **Option E is correct** because a handsaw is a manual version of the circular saw. **Option A is incorrect** because a band saw is best used for metals and intricate work. **Option B is incorrect** because a table saw is best used for rip cuts, or lengthwise cutting of boards. **Option D is incorrect** because a jigsaw has a delicate blade designed for fine detail work.

Competency 018—The Technology Education teacher demonstrates knowledge of construction materials and their properties.

20. Which of the following is the strongest alloy?

- A. Steel
- B. Tungsten
- C. Chromium
- D. Titanium

Answer

Option A is correct because the strongest alloy is steel mixed with a few other elements. Steel alloys rank first in the top ten for yield and tensile strength. **Options B, C and D are incorrect** because tungsten, chromium, and titanium alloys are not stronger than steel.

Competency 019—The Technology Education teacher demonstrates knowledge of skills and techniques used for building, maintaining and repairing structures.

21. Which of the following is the main advantage of using roof trusses when building houses?

- A. Trusses expedite the building process.
- B. Trusses prevent rainwater from damaging the roof decking.
- C. Trusses provide a strong and secure cover for the house.
- D. Trusses create a moisture barrier to protect the wooden framing.

Answer

Option A is correct because the major advantage of trusses is that the roof can be built much more quickly. **Option B is incorrect** because metal drip edges keep rainwater from damaging the ends of the wooden decking. **Option C is incorrect** because trusses do not cover the house; gable roofs have two sloping sides that meet at the ridge, which makes a strong and secure cover for the house. **Option D is incorrect** because insulation has waterproof paper attached to one side that faces the inside of the house and keeps moisture away from the wooden framing materials.

Domain V—Energy, Power and Transportation

Competency 020—The Technology Education teacher demonstrates knowledge of scientific concepts related to energy and power.

22. Which of the following types of energy is primarily created by electromagnetic waves?

- A. Chemical energy
- B. Sound energy
- C. Nuclear energy
- D. Radiant energy

Answer

Option D is correct because the transportation of electromagnetic waves creates radiant energy. **Option A is incorrect** because chemical energy is created from the making and breaking of bonds in molecules. **Option B is incorrect** because sound energy is produced when compression and rarefaction waves travel through the air. **Option C is incorrect** because nuclear energy is produced when nuclear mass is converted into energy.

Competency 021—The Technology Education teacher understands issues related to energy consumption and conservation.

23. Which of the following is the most common type of active solar collector?

- A. Flat-plate
- B. Direct gain
- C. Parabolic dish
- D. Linear-concentrating parabolic

Answer

Option A is correct because the most common type of active solar collector is the flat-plate collector because of its simplicity and reliability. **Options B, C and D are incorrect** because they are less commonly used solar collectors.

Competency 022—The Technology Education teacher understands characteristics of thermal, electrical, fluid and mechanical power systems and methods of control, transmission and storage of energy and power.

24. A wheelbarrow is an everyday example of which of the following types of levers?

- A. Class-1
- B. Class-2
- C. Class-3
- D. Class-4

Answer

Option B is correct because a class-2 lever has the load between the effort and the fulcrum, as on a wheelbarrow. **Option A is incorrect** because a class-1 lever has the fulcrum between the load and the effort, as on a pair of scissors. **Option C is incorrect** because a class-3 lever has the effort between the fulcrum and the load, as on a shovel. **Option D is incorrect** because there are only three classes of levers.

Competency 023—The Technology Education teacher demonstrates knowledge of principles and applications of electronics.

25. Rising temperature in a copper wire has which of the following effects on the flow of electricity?

- A. Electrical flow increases.
- B. Electrical flow decreases.
- C. Electrical flow does not change.
- D. Electrical flow is not carried.

Answer

Option B is correct because according to Ohm's law, increasing the resistance of the circuit will lower the current. Raising the temperature of copper increases its resistance by 0.393 percent per degree Celsius. **Options A and C are incorrect** because increasing temperature increases resistance, which lowers the current flow. **Option D is incorrect** because copper is able to conduct electricity at varying temperatures.

Competency 024—The Technology Education teacher demonstrates knowledge of the design and use of vehicles and vehicular subsystems and the characteristics of land, air, water and space transportation systems.

26. A teacher asks an eighth-grade class to design a paper airplane that can fly high on a windy day. The assigned activity best teaches students the principle of

- A. thrust.
- B. force.
- C. lift.
- D. gravity.

Answer

Option C is correct because lift is the aerodynamic force that holds an airplane in the air. **Option A is incorrect** because thrust is generated by airplane engines. **Options B and D are incorrect** because force and gravity are too broad and could apply to many activities, not just activities related to airplanes.

Domain VI—Biotechnology and Computer Technology

Competency 025—The Technology Education teacher understands the role of biotechnology in business, industry and society.

27. Which of the following topics best addresses a primary ethical concern of biofuel production?

- A. Biofuel production often uses bioremediation to stimulate bacteria that turns waste into harmless by-products.
- B. Biofuel production often causes food and energy to compete for limited agricultural resources.
- C. Biofuel production can lead to unintentional cross-pollination of weeds and wild relatives of the crop species.
- D. Biofuel production can create a carbon-monoxide-infused slurry that requires special care and disposal.

Answer

Option B is correct because research shows that competition for limited agricultural resources is by far the primary concern of biofuel technologies. **Option A is incorrect** because bioremediation is one of the primary concerns of environmental biotechnology and waste treatment. **Option C is incorrect** because cross-pollination is a major concern associated with genetically modified food. **Option D is incorrect** because carbon-monoxide-infused slurry is associated with bioleaching technologies.

28. The United States government currently regulates food produced from genetically modified crops by

- A. treating it like any other food, irrespective of production method.
- B. requiring some foods in this category to carry a 'bioengineered' label.
- C. delaying approval while testing for long-term side effects.
- D. banning it for human consumption through legislation.

Answer

Option B is correct because foods made with agricultural products on the National Bioengineered Food Disclosure Standard's List of Bioengineered Foods must indicate this as of 2022. **Option A is incorrect** because of the existence of the National Bioengineered Food Disclosure Standard. **Option C is incorrect** because foods produced from genetically modified crops are not tested more than other foods. **Option D is incorrect** because not only are genetically modified crops not banned, but some sources estimate that up to 85 percent of United States corn is genetically engineered.

Competency 026—The Technology Education teacher demonstrates knowledge of principles of bio-related technologies.

29. Which of the following pieces of equipment is used to view internal structures without the use of radiation?

- A. CT scan
- B. Mammography
- C. Ultrasound
- D. X-ray

Answer

Option C is correct because the main advantage of ultrasound is that certain internal structures can be observed without using radiation. **Option A is incorrect** because Computerized Tomography (CT) or Computerized Axial Tomography (CAT) scanning adds x-ray images with the aid of a computer to generate cross-sectional views of a patient's anatomy, which exposes patients to radiation. **Option B is incorrect** because mammography exposes patients to radiation; it is a specific type of imaging that uses a low-dose x-ray system to examine breasts. **Option D is incorrect** because imaging with x-rays involves exposing a part of the body to a small dose of ionizing radiation to produce pictures of the inside of the body. X-rays are the oldest and most frequently used form of medical imaging.

Competency 027—The Technology Education teacher demonstrates knowledge of basic principles related to computer technology.

30. Which of the following is the fastest type of cache memory in a computer?

- A. L1
- B. L2

- C. RAM
- D. ROM

Answer

Option A is correct because the L1 cache works at the speed of the processor. **Option B is incorrect** because the L2 cache is generally two to three times slower than the L1 cache. **Option C is incorrect** because RAM is six times slower than the L1 cache. **Option D is incorrect** because ROM is not a type of cache memory.

31. Which of the following is a unique numerical identifier assigned to computers that are networked on an intranet or through the Internet?

- A. MAC address
- B. ISSN
- C. IP address
- D. SSID

Answer

Option C is correct because an IP address is a unique numeric identifier for a computer or other device on a TCP/IP network. **Option A is incorrect** because a media access control address (MAC address) is a unique identifier assigned to most network adapters or network interface cards (NICs) by the manufacturer for identification. **Option B is incorrect** because an International Standard Serial Number (ISSN) is an identifier assigned to a device that is permanent, in the same way ISBNs uniquely identify books. **Option D is incorrect** because a system set identifier (SSID) is the name of a wireless local area network (WLAN).

Competency 028—The Technology Education teacher understands appropriate and effective uses of computer technology.

32. Which of the following types of software is best for gathering data and presenting an analysis?

- A. System
- B. Educational
- C. Multimedia
- D. Productivity

Answer

Option D is correct because productivity software includes word processing, spreadsheet, presentation, database, personal information management, and personal finance applications. Spreadsheet software enables users to do calculations and manipulate numerical analyses easily using built-in formulas. **Option A is incorrect** because system software is software that enables a computer to run, such as operating system software, drivers for hardware devices, and computer resource management programs. **Option B is incorrect** because educational software includes products that teach users new skills such as typing, speaking a language, cooking, or playing an instrument. **Option C is incorrect** because multimedia software includes image editing, video editing, and auditing software; animation software; and other specialty software required to produce computer games, animations and movies.